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DECUS NO.	8-171
TITLE	Real-Time System for Behavioral Science Experiments
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DATE	September 1967
SOURCE LANGUAGE	PAL III

20330

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REAL-TIME SYSTEM FOR BEHAVIORAL SCIENCE EXPERIMENTS

DECUS Program Library Write-up

DECUS No. 8-171

ABSTRACT

This program controls the operations of behavioral chambers using four classical experimental designs; Punishment Discrimination (PD), Non-discriminated Avoidance (NDA), Fixed Ratio (FR), and Differential Rate of Low Response (DRL). Besides controlling the experiments, certain statistics are accumulated during the experiments for printout at the end of each test run.

REQUIREMENTS

Storage

This system utilizes most of the available internal memory.

Equipment

This system uses the basic PDP-8 computer, 12-bit word length, 4096 words of core memory. The standard ASR-33 Teletype machine is used for input/output. The behavioral chambers are modified Foringer boxes, model number 3032. The interface which acts as an input-output buffer between the computer and the boxes was designed at the Sterling Forest Research Center, Union Carbide Corporation, Tuxedo, New York with the help of a local representative from Digital Equipment Corporation.

Miscellaneous

For a continuous record of each animals performance, we use Gerbrands cumulative recorders. These recorders are not mandatory equipment but we would strongly recommend them. Foringer Shock Producing Equipment was also used.

USAGE

Loader

The program is loaded by the Binary Loader, Digital-8-2-U. The Master Tape should be loaded first, followed by the system tapes.

Start Up and/or Entry

The program starting address is 0200. Set 0200 in the switch register and depress LOAD and START.

Individual experiments are initiated by the box calling sequence and the first lever press (simulated) after the animal is placed in the box.

Errors in Usage

Errors in keying in the box calls are the only external errors.

Recovery from Such Errors

If the first character struck by the operator is not a valid box code, A-J, the program will ignore it and the operator should rekey the correct character.

After the first character, errors in keying may be corrected by loading the correct information via the switch register before the first lever press. In any event, it is very important that the operator complete keying in all the necessary information for the box.

DESCRIPTION

The PD System utilizes the first three boxes, A, B and C. There are four schedules available under this system, which may be called by one or more of the boxes. The criterion schedule is made up of six 15 minute segments. Each segment contains a 12 minute VI2 phase and a 3 minute FR1 phase. A constant tone is introduced during the FR1 phase and a shock is delivered along with the liquid reinforcement for every lever press. The shock duration is fixed at 0.4 seconds, but the intensity may be varied for each animal. Three schedules are used for training the animals. The first level of training is a fixed ratio of one (FR1). This is used to get the animal accustomed to the environment, the lever and the food trough. Next, the trainee is put on a variable interval schedule, VI2. Here, reinforcement is given only after an interval of time has elapsed and if a response was made in the last 0.5 second of the interval. Otherwise, the interval is suspended until the subject makes a response. On the average, a good worker will receive a reinforcement every two minutes. The final stage in training is the same schedule as the criterion schedule without the shock.

The basic NDA system comprises boxes D, E, F and G. However, we have alternate binary tapes which when loaded into memory will extend this system to all ten boxes. The schedule used in this system has three phases. The Response-to-Shock phase (RS), the Shock-to-Shock phase (SS), and the Shock phase. The Shock phase is fixed at 0.5 second duration and it begins at the end of either of the other two phases. During the Shock phase, no lever presses are serviced. The RS phase duration may be varied from 1 to 99 seconds. This phase is entered at the start of the test and after each serviced lever press. The SS phase duration may be varied from 1 to 99 seconds. This phase is entered at the end of the Shock phase. If a lever press occurs in the RS or SS phase, the schedule jumps to the start of an RS phase. Again, the shock intensity may be varied for each animal.

Boxes H, I and J are primarily assigned to the FR/FI system. Again, an alternate tape is available to extend this system to include boxes D, E, F and G. Two schedules are available. In the Fixed Ratio schedule (FR) the animal is reinforced after a fixed number of lever presses. The Fixed Ratio may be varied from 1 to 99 for each test run. The other schedule features an FR period alternating with an FI period. The FR period works the same as in the FR schedule. During the FI

(Fixed Interval) period, no reinforcement is given until the end of the period; and then, only if the animal has responded in the last 10 seconds. The durations of these periods may be varied from 0 to 9 minutes in steps of 1 minute.

The DRL system utilizes boxes H, I and J. In this system, an animal is reinforced when the interval between responses satisfies the test criteria. From the input data, upper and lower limits are established for the response interval. The lower limit may be varied from 10 to 30 seconds in two second steps. The upper limit can set from two seconds above the lower limit to infinity (NO LIMITED HOLD). However, when a limited hold is specified, it should be such that the upper limit does not exceed 40 seconds.

Examples and/or Applications

With the programs available, we could run any of the above schedules in the following combinations:

<u>Box</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>
A	PD	PD	PD	PD	NDA	NDA	NDA	NDA
B	PD	PD	PD	PD	NDA	NDA	NDA	NDA
C	PD	PD	PD	PD	NDA	NDA	NDA	NDA
D	NDA	NDA	FR/FI	FR/FI	NDA	NDA	FR/FI	FR/FI
E	NDA	NDA	FR/FI	FR/FI	NDA	NDA	FR/FI	FR/FI
F	NDA	NDA	FR/FI	FR/FI	NDA	NDA	FR/FI	FR/FI
G	NDA	NDA	FR/FI	FR/FI	NDA	NDA	FR/FI	FR/FI
H	FR/FI	NDA	FR/FI	NDA	FR/FI	NDA	FR/FI	NDA
I	FR/FI	NDA	FR/FI	NDA	FR/FI	NDA	FR/FI	NDA
J	FR/FI	NDA	FR/FI	NDA	FR/FI	NDA	FR/FI	NDA

<u>Box</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
A	PD	PD	NDA	NDA
B	PD	PD	NDA	NDA
C	PD	PD	NDA	NDA
D	NDA	FR/FI	NDA	FR/FI
E	NDA	FR/FI	NDA	FR/FI

<u>Box</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>
F	NDA	FR/FI	NDA	FR/FI
G	NDA	FR/FI	NDA	FR/FI
H	DRL	DRL	DRL	DRL
I	DRL	DRL	DRL	DRL
J	DRL	DRL	DRL	DRL

Scaling

The "99" limits mentioned could be exceeded by selection of non-numeric characters. The first character keyed in is subtracted by 260₈ and then multiplied by 128. The second character is subtracted by 260₈ and then added to the product just calculated to obtain the desired time or ratio. Therefore, keying in 9: would yield a value of 144₈ or 100₁₀ and 9Z would produce 124₁₀.

METHODS

Discussion

For the NDA and FR/FI systems we calculate the following statistics, frequency, 'D' squared and the variance of the frequency.

Algorithms

The frequency (average responses per minute) is calculated by multiplying the total number of responses made by the reciprocal of the total time in minutes.

'D' squared is equal to the sum of the squares of the responses per minute minus the square of the total responses divided by the total time.

The variance is equal to 'D' squared divided by the total time - 1.

Accuracy

The statistics calculations are done in double precision.

Error Table for Functions

In converting the binary numbers to decimal numbers for printout, occasionally, we get a colon (:) in the last digit of either the integer or the fraction portions of the decimal number. This should be counted as being equal to 10 for that position. For example; 0.87: is equal to 0.880.

FORMAT

Input Data

Inputs to the program are the box calls to initiate a new schedule or test for a given box. These calls are as follows:

<u>System</u>	<u>Schedule</u>	<u>Call</u> *
PD	FR1	Any character whose octal code is less than 260, examples: /.,
	VI2	The number zero, 0
PD	VI2 + FR1, W/T	The number one, 1
	VI2 + FR1, W/T + S	The number two, 2
NDA	RS40/SS20	Four numbers, example: 4020
	One hour extention	Any alphabetic character, example: X
FR/FI	FR15	Two numbers, example: 15
	A 3 minute FR25, followed by a 1 minute FI	Four numbers, example: 2531
DRL	DRL 20/LH 2	Four numbers, example: 2002
	DRL 20/NLH	Four numbers, example: 2000

After the box call has been made, the animal is placed in the box and the first lever press is simulated by depressing the button on the top of the box. This action causes the house light to come on, starts the cumulative recorder, and initiates the test run.

All lever presses made by the animal are inputs to the program and they cause a program interrupt.

Core Data

The Clock Flag Register contains one bit for each box that currently requires clock servicing. The bits are set by the program after the first lever press is detected. They are reset by the program when the test is completed. Bits 0 - 9 correspond to boxes A - J.

* All calls shown would be preceded by the Box Letter. Example: Complete call for a schedule of FR15 in Box H would be "H15".

Miscellaneous

The Lever Buffer Register of 12-bits is located in the interface. It contains one bit for each box that currently requires lever servicing. The bits are set automatically when the animal makes a complete response. They are reset automatically when the register is read into the accumulator. Bits 0 - 9 correspond to boxes A - J.

There are five Output Buffer Registers. Two boxes are serviced simultaneously by each register. The bit assignment is as follows:

Bits 0 and 6 control the shock scramblers

Bits 1 and 7 control the box speakers

Bits 2 and 8 control the stimulus lamps

Bits 3 and 9 control the house lights

Bits 4 and 10 control the solid reinforcements

Bits 5 and 11 control the liquid reinforcements

Bits 0 - 5 control boxes A, C, E, G, and I through their respective buffers. Bits 6 - 11 control boxes B, D, F, H, and J through their respective buffers. The bits are set and reset under program control. The buffer settings are executed under program control.

EXECUTION TIME

The execution time depends on the schedules called for in each box. In the PD system, the FR1 and VI2 schedules have 60 minutes durations. The criterion schedules run for 90 minutes.

In the NDA system, the first run is for 3 1/2 hours. If desired, this may be extended for additional runs of one hour intervals.

All FR/FI schedules have 60 minutes durations.

DRL schedules run for two hours.

PROGRAM

Core Map

<u>Page</u>	<u>Contents</u> *
0	Temporary Buffer Registers, short subroutines, constants and statistic dump area.
1	Interrupt Servicing Routines
2	FR/FI System - FR/FI Keyboard
3-14	Box Schedules

<u>Page</u>	<u>Contents</u> *
15	FR/FI System - FI Clock
16	Data Storage for boxes H, I and J and FR/FI System Subroutines
17	Data Storage for boxes A, B, C and PD System Keyboard
20	NDA and DRL Systems Keyboard
21	Data Storage for boxes D, E, F and G.
22	NDA System - Clock
23	NDA and DRL Systems Printout
24	FR/FI System - FI Lever
25	PD System - VI2 Clock, FR1 Clock and Lever
26	PD System - VI2 phase of Criterion Schedule Clock and Lever, VI2 Lever
27	PD System - FR1 phase of Criterion Schedule Clock and Lever
30	PD System - Printout and Calculations
31	FR/FI System - FR Clock and Lever
32	FR/FI System - Printout and Calculations
33	Printout and Calculation Subroutines
34	Print Subroutines
35	Multiplication Subroutines
36	Printout and Calculation Subroutines
37	Binary and RIM Loaders

* These are the primary contents of each page. There may be some small subroutines on any given page that are used by other systems. The box schedule pages and pages 16, 17 and 21 will vary depending upon which systems are currently in use.

The NDA System Lever, DRL System Clock and Lever Routines are located within their respective box schedule pages.

Additional Instructions

CCF (6112) - Clear clock flag - The internal clock interrupt flag is cleared.

CSF (6111) - Skip on clock flag - The clock flag is sensed, and if it contains a binary 1 the contents of the PC is incremented by one so that the next sequential instruction is skipped.

LASF (6121) - Skip on lever flag - The lever flag is sensed, and if it contains a binary 1 the content of the PC is incremented by one so that the next sequential instruction is skipped.

LARB (6126) - Read lever buffer register - The contents of the lever buffer is read into the accumulator. The lever buffer register and the lever flag are both cleared.

STATIC - Read Output Buffer Register - The content of the output buffer register is sent to its boxes and the status of the boxes is altered accordingly. The output buffer register is cleared.

BAF (6142). Read Output Buffer Register (STATIC) for Boxes A and B

BBF (6152). Read Output Buffer Register (STATIC) for Boxes C and D

BCF (6162). Read Output Buffer Register (STATIC) for Boxes E and F

BDF (6172). Read Output Buffer Register (STATIC) for Boxes G and H

BEF (6302). Read Output Buffer Register (STATIC) for Boxes I and J

DYNAMIC - Read Output Buffer Register - The content of the accumulator is read into the selected output buffer register and then it is sent to the boxes and the status of the boxes is altered accordingly. The output buffer register is cleared. The accumulator is unchanged.

BAL (6146). Read Output Buffer Register (DYNAMIC) for Boxes A and B

BBL (6156). Read Output Buffer Register (DYNAMIC) for Boxes C and D

BCL (6166). Read Output Buffer Register (DYNAMIC) for Boxes E and F

BDL (6176). Read Output Buffer Register (DYNAMIC) for Boxes G and H

BEL (6306). Read Output Buffer Register (DYNAMIC) for Boxes I and J

EXPERIMENT SEQUENCE

1. Called via the Keyboard.

- a. Establishes the schedule and the box.
- b. Activates the box to lever interrupts.

2. First Lever Press.

- a. Activates the box to clock interrupts.
- b. Turns on the box house lights.
- c. Recorder starts when the light goes on.

3. Clock and Lever Interrupts.

- a. Serviced according to the particular schedule until the end of the experiment is determined.
- b. When the experiment duration time has elapsed, the following events take place.
 - (1.) The box is inactivated to clock and lever interrupts.
 - (2.) House light and all other components in the box are turned off.
 - (3.) The cumulative recorder is stopped.
 - (4.) The printout interrupt is initiated.

4. Printout

- a. The data is dumped into a reserved area in page zero.
- b. Printout proceeds with interruptions by clock and levers from other boxes taking priority over the printout.

PRINTOUT NOMENCLATURE

1. PD System (see figure 1)

SG - Segment; each segment is for 15 minutes.
RT - Number of Responses made during each segment
SR - Number of reinforcements given during each segment

2. NDA System (see figure 2)

SG - Segment; each segment is for 30 minutes
RT - Number of responses made during each segment
SH - Number of shocks received during each segment
FREQ - Frequency of responses per minute
D SQ - The statistic D squared
S SQ - The variance or standard deviation squared

Note: The above statistics are not calculated for the first 30 minute segment. Therefore, the times under the CUM DATA heading refer to the 1st, 2nd, and 3rd hours after the initial 30 minute warm-up period.

3. FR/FI System (see figure 3)

FI - Time-in minutes, the first digit denotes the FR interval and the second digit denotes the FI interval.
FR - Fixed Ratio; number of responses per reinforcement
SG - Segment; each segment is for 15 minutes
RT - Number of responses made during each segment

SR - Number of reinforcement received during each segment

CUM DATA - Same as for the NDA system, except the first line refers to the performance during the first 30 minutes and the second line is a summary of the performance during the second 30 minutes.

Note: Blank fields under any of the headings indicate that the animal did not work at all in that interval.

4. DRL System (see figure 4)

DRL - Minimum time between responses in seconds for reinforcement eligibility

LH - Limited hold in seconds above the minimum time. If blank, there is no limited hold for this experiment.

SG - Segment; each segment represents a two second interval of the time axis.

14 - This row contains the number of responses made at intervals of 0 to 14 seconds.

28 - This row contains the number of responses made at intervals of 14 to 28 seconds.

42 - This row contains the number of responses made at intervals greater than 28 seconds. The first six segments represent the intervals from 28 to 40 seconds and the last segment is for all response intervals over 40 seconds.

RT - Number of responses made during the experiment.

SR - Number of reinforcements received during the experiment.

PD SYSTEM SAMPLE PRINTOUTS

Call: A/

FR1, BOX A

SG	1	2	3	4	5	6
RT	125	132	47	23		
SR	125	132	47	23		
	327	327				

Call: AØ

VI2, BOX A

SG	1	2	3	4	5	6
RT	253	264	219	188		
SR	7	8	7	7		
	924	29				

Call: A1

VI2+FR1+T BOX A

SG	1	2	3	4	5	6
VI/RT	165	156	172	147	161	152
VI/SR	6	5	7	6	7	5
FR/RT	23	25	9	15	11	8
	953	36	91			

Call: A2

VI2+FR1+T ,S BOX A

SG	1	2	3	4	5	6
VI/RT	149	126	135	142	156	175
VI/SR	6	5	6	7	5	6
FR/RT	4	2	1	3	2	2
	883	35	14			

Note: The numbers under each box summary are the totals of the first, second and third rows in that order.

Figure 1.

NDA SYSTEM SAMPLE PRINTOUTS

Call: D4020
NDA 40/20

BOX D

SG	1	2	3	4	5	6	7
RT	30	40	40	40	40	40	74
SH	75	75	75	76	76	76	68

CUM DATA	FREQ	D SQ	S SQ
030-090	1.333	393.339	6.660
090-150	1.333	393.339	6.660
150-210	1.899	851.410	14.423

Call: E4020

NDA 40/20 BOX E

SG	1	2	3	4	5	6	7
RT	30	40	40	40	40	40	51
SH	76	75	75	76	76	75	70

CUM DATA	FREQ	D SQ	S SQ
030-090	1.333	393.339	6.660
090-150	1.333	337.339	5.711
150-210	1.516	466.988	7.897

Call: DD (one hour extension of previous run)

NDA 40/20 BOX D

SG	1	2	3	4	5	6	7
RT						40	40
SR						78	78

CUM DATA	FREQ	D SQ	S SQ
030-090	.000	.000	.000
090-150	.000	.000	.000
150-210	1.333	693.339	11.745

Call: EE (one hour extension of previous run)

NDA 40/20 BOX E

SG	1	2	3	4	5	6	7
RT						40	40
SH						78	78

CUM DATA	FREQ	D SQ	S SQ
030-090	.000	.000	.000
090-150	.000	.000	.000
150-210	1.333	693.339	11.745

Figure 2

FR/FI SYSTEM SAMPLE PRINTOUTS

Call: H15

FR	15, BOX	H		
SG	1	2	3	4
RT	25	25	25	25
SR	1	2	2	1

CUM DATA	FREQ	D SQ	S SQ
000-030	1.666	166.674	5.723
030-060	1.666	166.674	5.723

Call: H05₂1

FR/FI

FR	5, BOX	H		
SG	1	2	3	4
RT	25	25	25	25
SR	5	5	5	5

CUM DATA	FREQ	D SQ	S SQ
000-030	2.500	125.000	6.579
030-060	2.500	125.000	6.579

FI 21, BOX H

SG	1	2	3	4
RT	25	25	25	25
SR	1	1	1	1

CUM DATA	FREQ	D SQ	S SQ
000-030	5.000	.000	.000
030-060	5.000	.000	.000

Figure 3

DRL SYSTEM SAMPLE PRINTOUTS

Call: H2002

DRL	20 / LH	2, BOX H					
SG	1	2	3	4	5	6	7
14	18	9	2	1	2	3	5
28	4	8	10	15	15	9	2
42	2	1	2	0	0	0	0
RT	108						
SR	15						

Call: I2010

DRL	20 / LH	10, BOX I					
SG	1	2	3	4	5	6	7
14	29	3	3	2	2	5	4
28	10	10	9	8	7	3	3
42	2	1	2	2	1	1	1
RT	108						
SR	23						

Call: J2000

DRL	20 / LH	, BOX J					
SG	1	2	3	4	5	6	7
14	10	1	1	2	2	3	4
28	6	10	10	12	11	7	4
42	3	5	4	4	3	2	4
RT	108						
SR	59						

Note: Blocked in areas represent the pay-off regions.

Figure 4

Recovery from Keying Errors

Here are the locations of parameters that are set by the box calling routines. In the event of a miskey operation, the applicable parameters would have to be reset to their proper values manually via the switch register as follows:

1. Depress the STOP key.
2. Write down the content of the PC.
3. Toggle the parameter location into the switch register.
4. Depress the LOAD key.
5. Toggle the correct value of the parameter into the switch register.
6. Raise the DEPOSIT key.
7. Repeat steps 3 through 6 for each parameter.
8. Toggle the contents of the PC from step 2 into the switch register.
9. Depress LOAD key.
10. Depress START key.

PD System Parameters

Symbol	Correct Setting For				Location			
	FR1	VI2	C W/OS	C W/S	Box	A	B	C
TSBIT	Ø	Ø	1	2		36Ø1	3626	3653
SHKBT	Ø	Ø	Ø	1		Ø717	1117	1317
GE3Ø	7774	7774	7772	7772		Ø723	1123	1323
GEØ6	7761	7761	7764	7764		Ø731	1131	1331
GEØ7	Ø	1	1	1		Ø732	1132	1332

NDA System Parameters

Symbol	Correct Setting For			Location								
	<u>40/20</u>	<u>Est.</u>	<u>Box A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>J</u>
NRST (-RS)	7160	7160	0754	1154	1354	1554	1754	2154	2354	2554	2754	3154
NSST (-SS)	7470	7470	0755	1155	1355	1555	1755	2155	2355	2555	2755	3155
NPHT (-RS)	7160	7160	0756	1156	1356	1556	1756	2156	2356	2556	2756	3156

(Below listed parameters would be effected only by an error in second character)

NFSFLG	0	1	0757	1157	1357	1557	1757	2157	2357	2557	2757	3157
NTEST	7771	7776	0762	1162	1362	1562	1762	2162	2362	2562	2762	3162
NSH08	SHC1	SHC6	0763	1163	1363	1563	1763	2163	2363	2563	2763	3163
NRT04	SHC7	HSXQ3	0764	1164	1364	1564	1764	2164	2364	2564	2764	3164
NRT05	HSXQ3	LSXQ3	0765	1165	1365	1565	1765	2165	2365	2565	2765	3165
NRT06	LSXQ3	HSX3	0766	1166	1366	1566	1766	2166	2366	2566	2766	3166
NRT07	HSX3	LSX3	0767	1167	1367	1567	1767	2167	2367	2567	2767	3167
NRT08	RTC1	RTC6	0770	1170	1370	1570	1770	2170	2370	2570	2770	3170

FR/FI System Parameters

<u>Correct Setting For</u>	<u>FR/FI</u>	<u>Boxes</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>	<u>I</u>	<u>J</u>
Fixed Ratio	-FR		1532	1732	2132	2332	2532	2732	3132
Timer	-FR Time		1545	1745	2145	2345	2545	2745	3145
FR Time	-FR Time		1546	1746	2146	2346	2546	2746	3146
FI Time	-FI Time		1547	1747	2147	2347	2547	2747	3147
Fixed Ratio	$\frac{FR}{-FR}$		1540	1740	2140	2340	2540	2740	3140

DRL System Parameters

<u>Correct Setting For</u>	<u>DRL 2Ø</u>	<u>Boxes</u>	<u>H</u>	<u>I</u>	<u>J</u>
DRL	747Ø		255Ø	275Ø	315Ø
Lower Limit	7767		2556	2756	3156
	<u>LHØ2</u>				
LH	7754		2551	2751	3151
Upper Limit	7765		2552	2752	3152

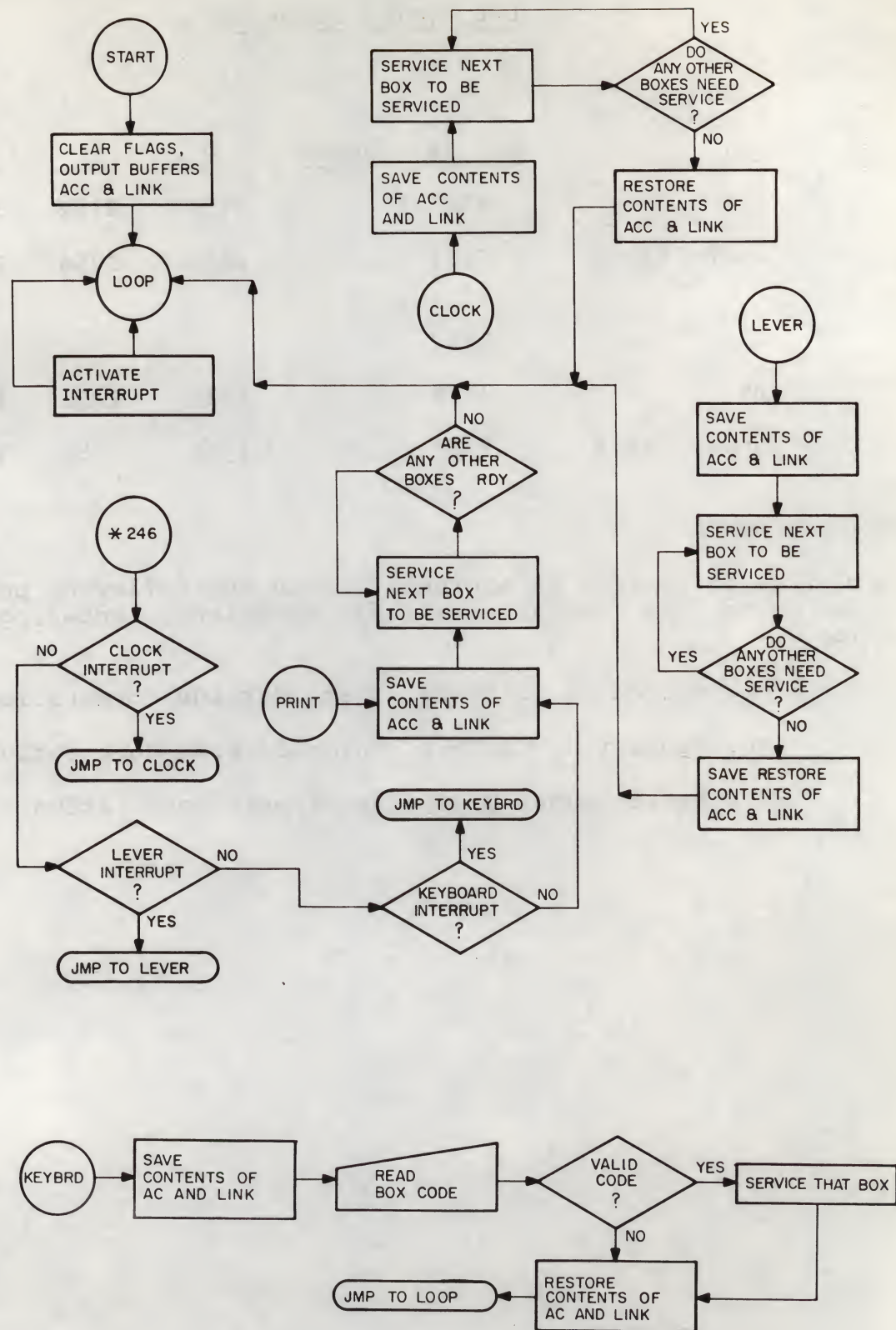
ACKNOWLEDGEMENTS

I would like to express my appreciation to the following people who assisted me on this program with their experience, knowledge and patience.

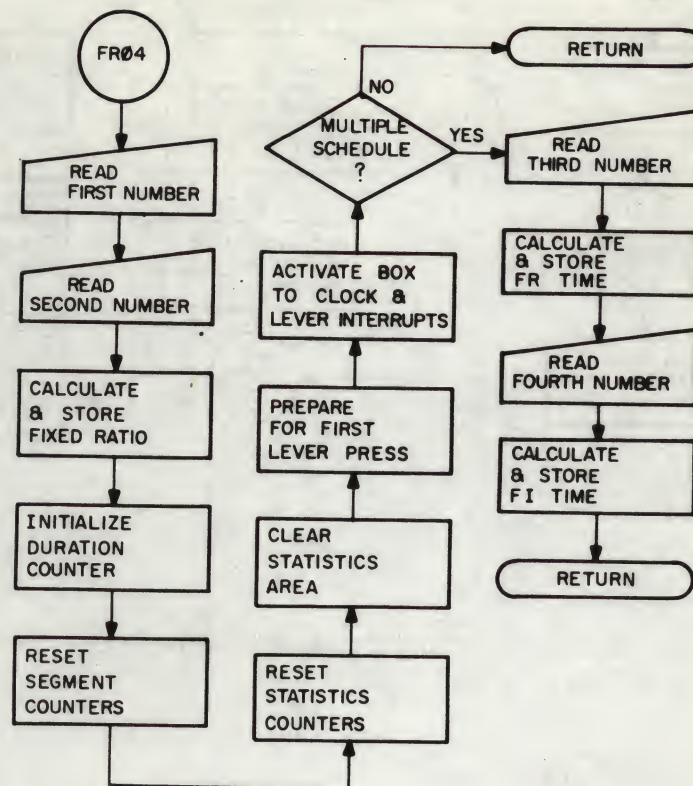
Dr. Morton E. Goldberg, Union Carbide Corporation

Mr. Vincent B. Ciofalo, Union Carbide Corporation

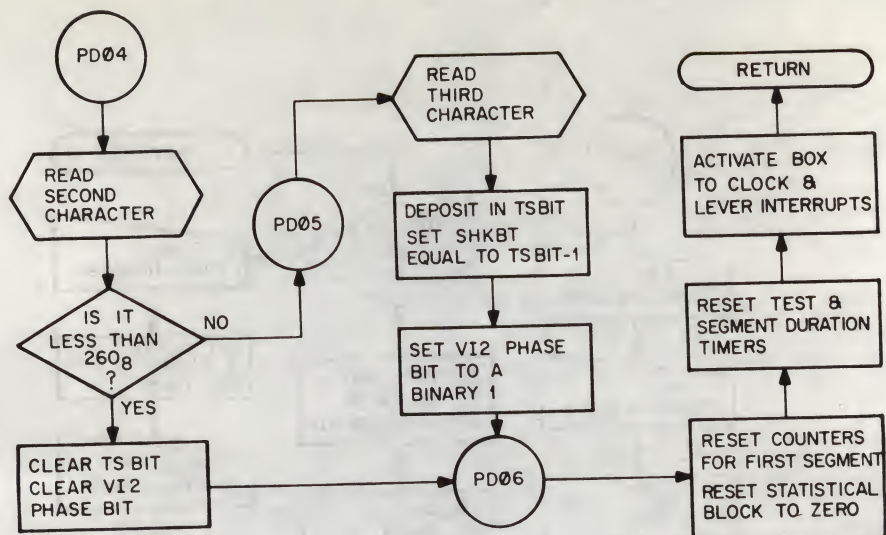
Mr. David Dodge, Digital Equipment Corporation



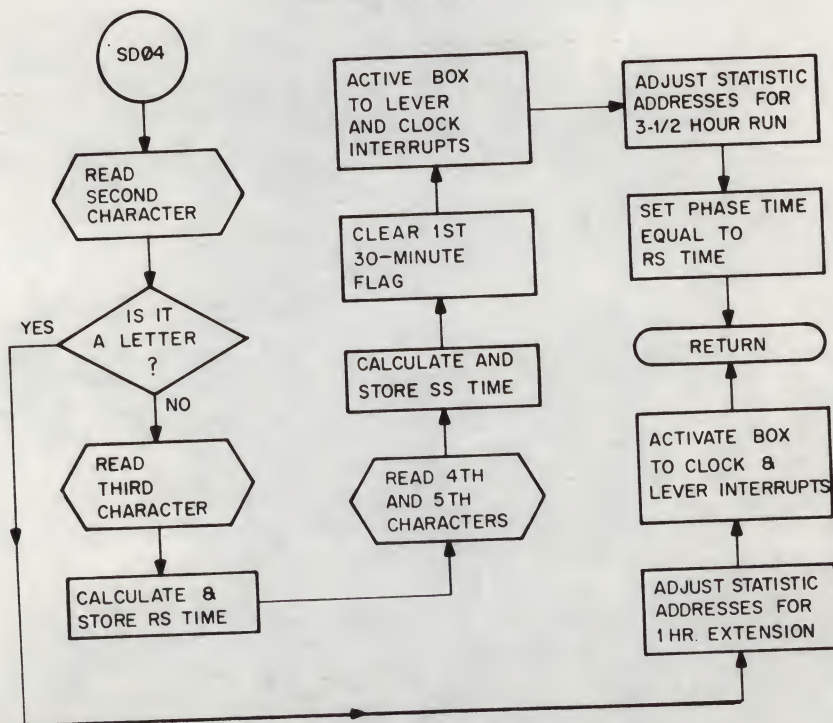
Interrupt Service Routines



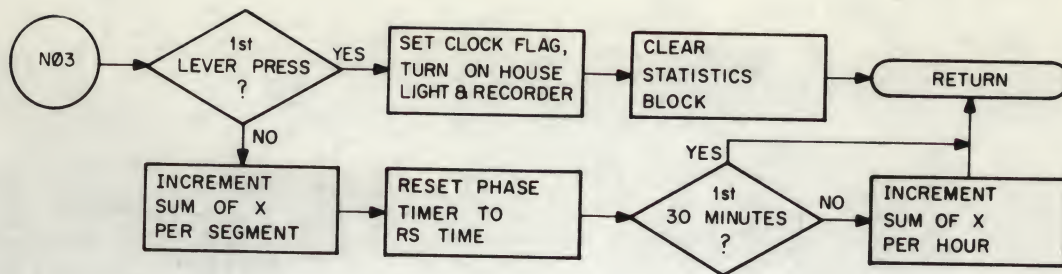
FR/FI System: FR/FI Keyboard



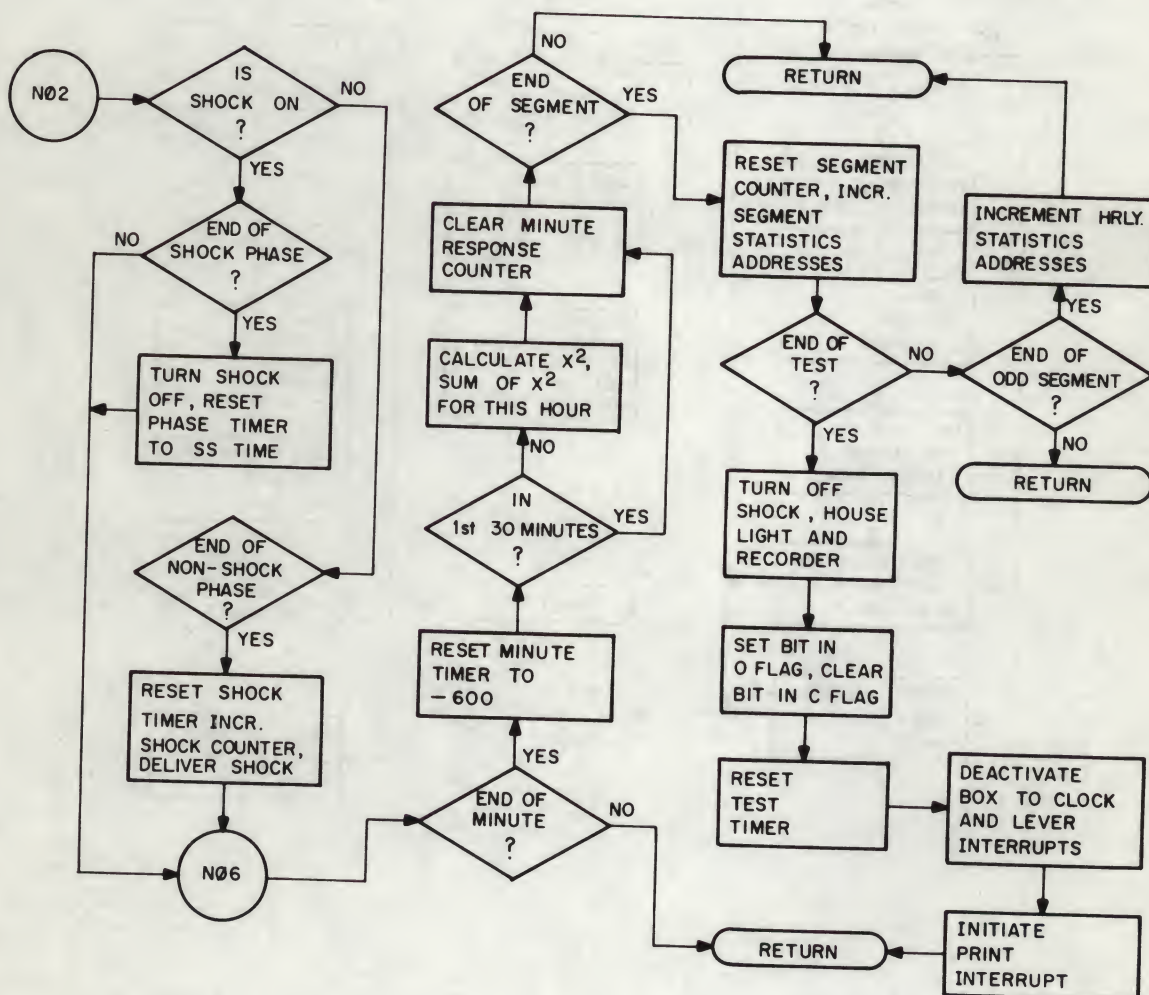
PD System Keyboard



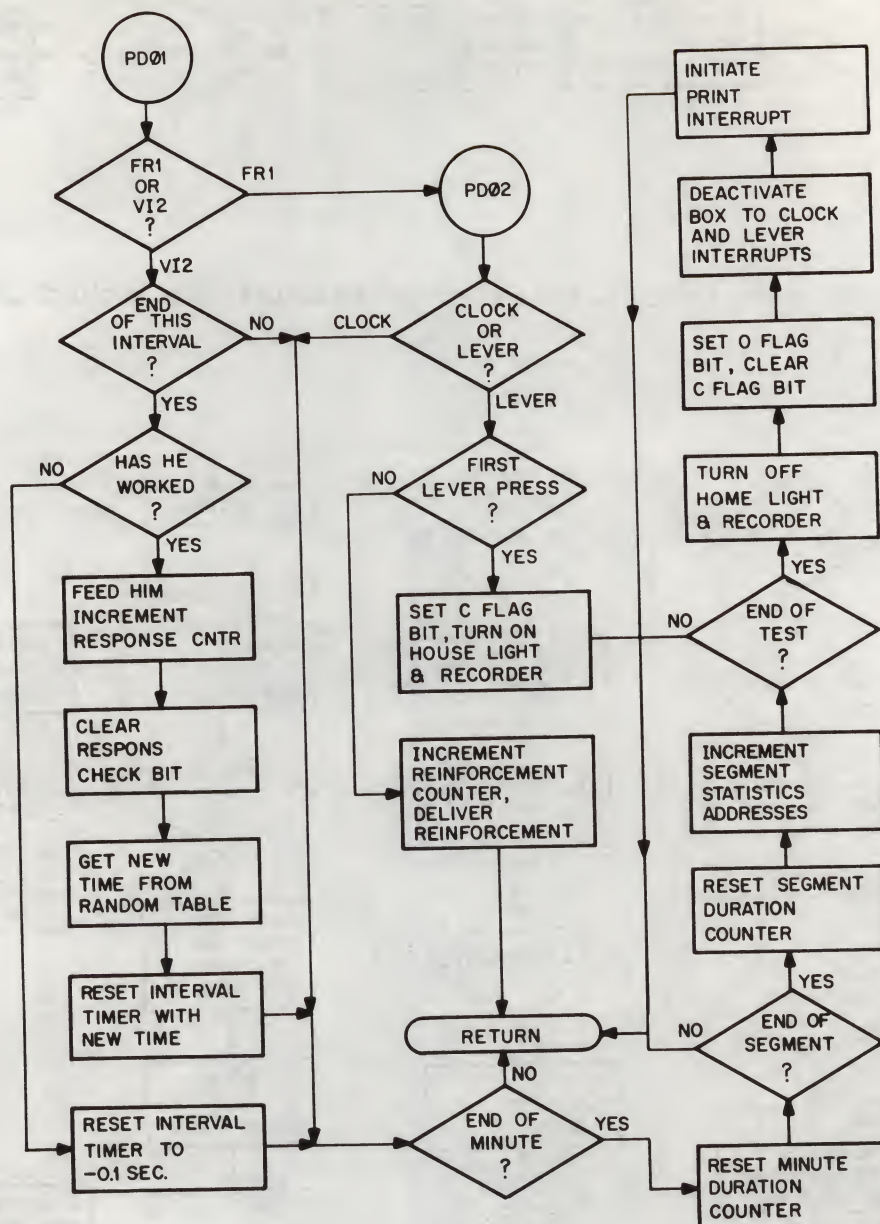
NDA System Keyboard



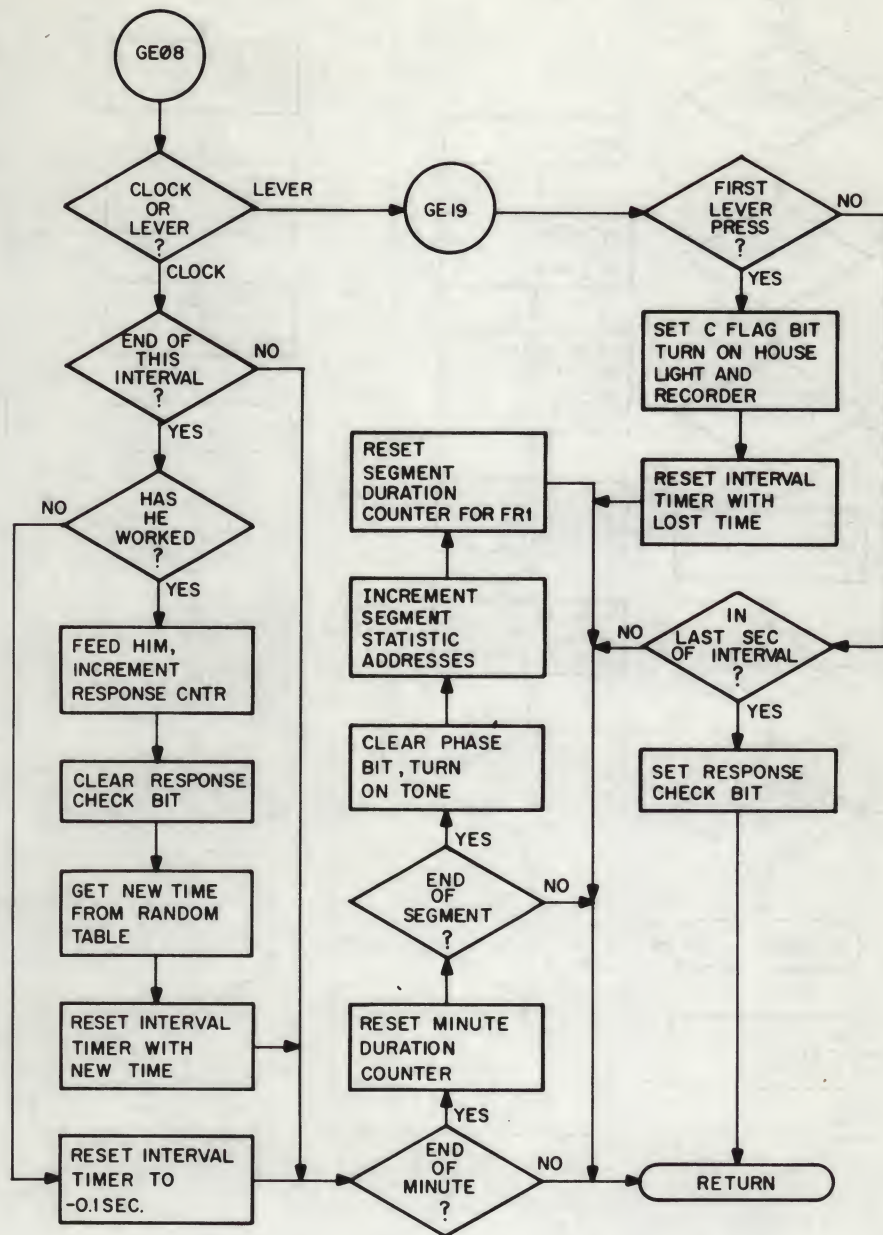
NDA System Lever (in each individual box schedule page)



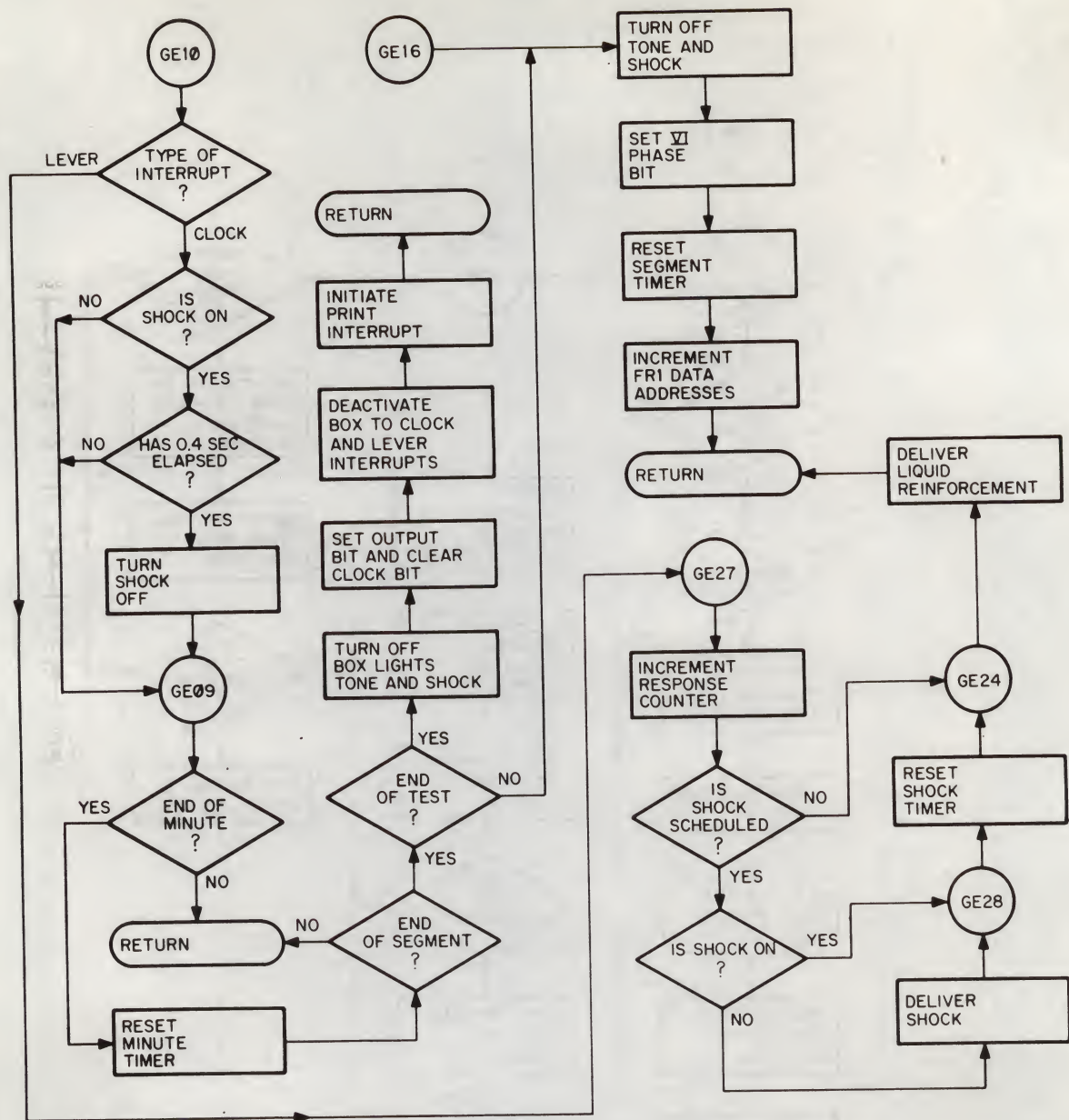
NDA System Clock



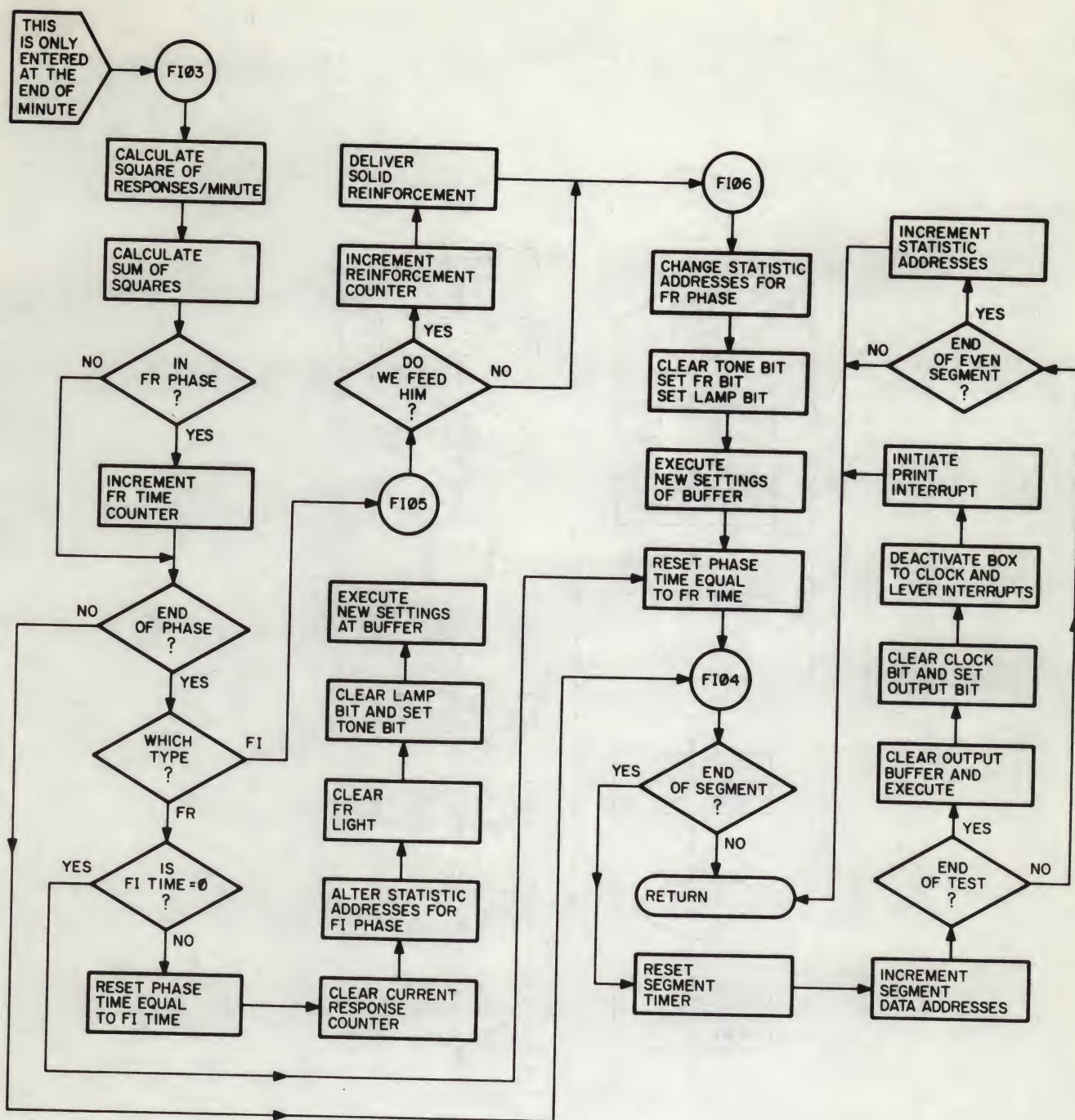
PD System: VI2 Clock, FR1 Clock and Lever



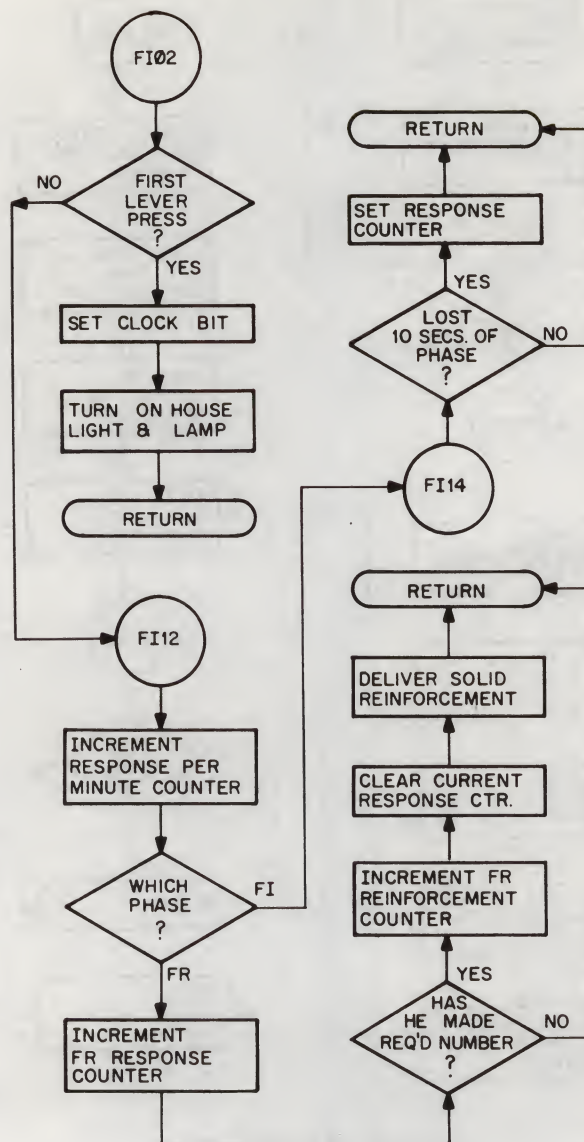
PD System: VI2 Lever, Criterion Schedule V12 Phase Clock and Lever



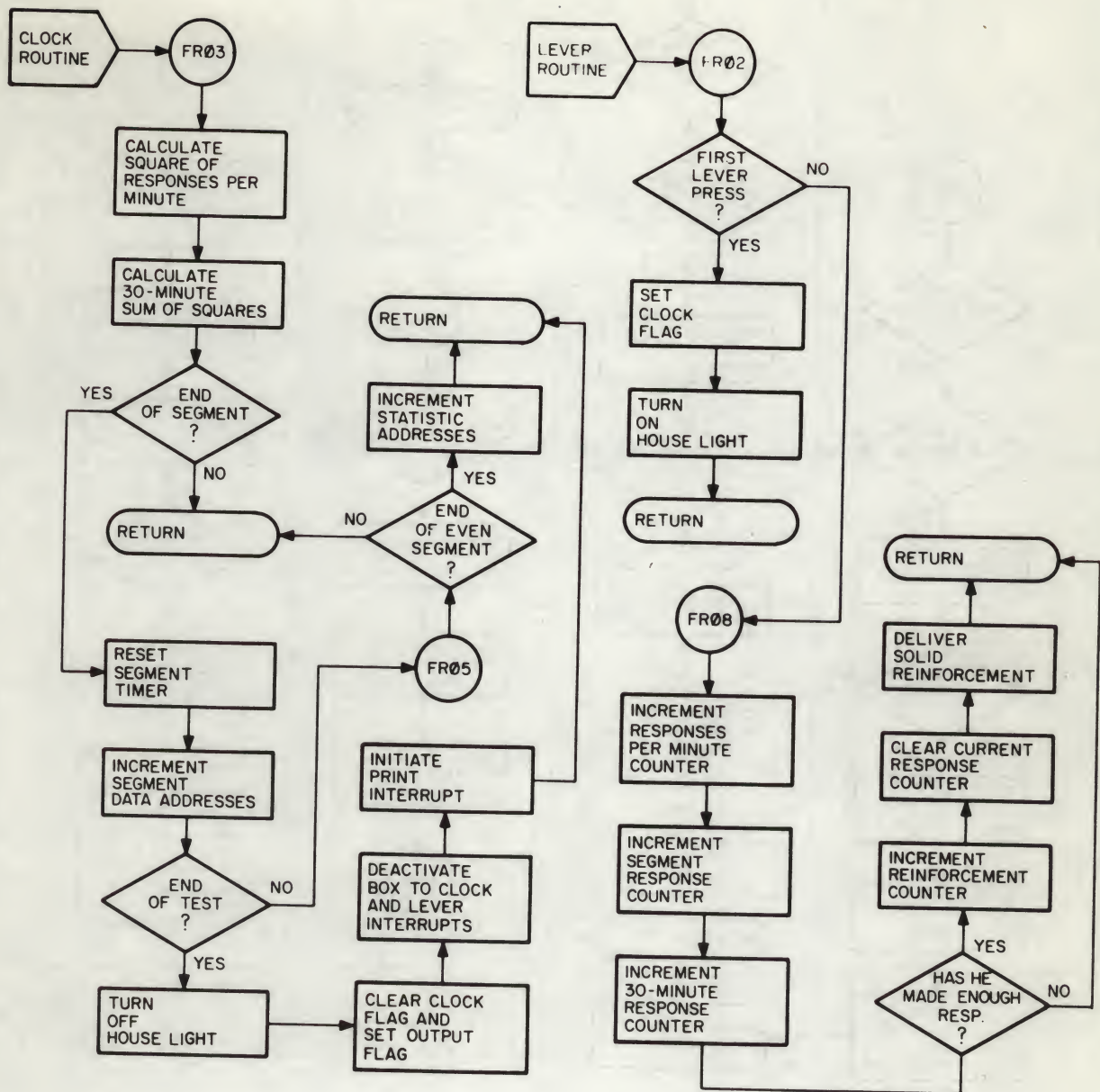
PD System: FR1 Phase of Criterion Schedule Clock and Lever



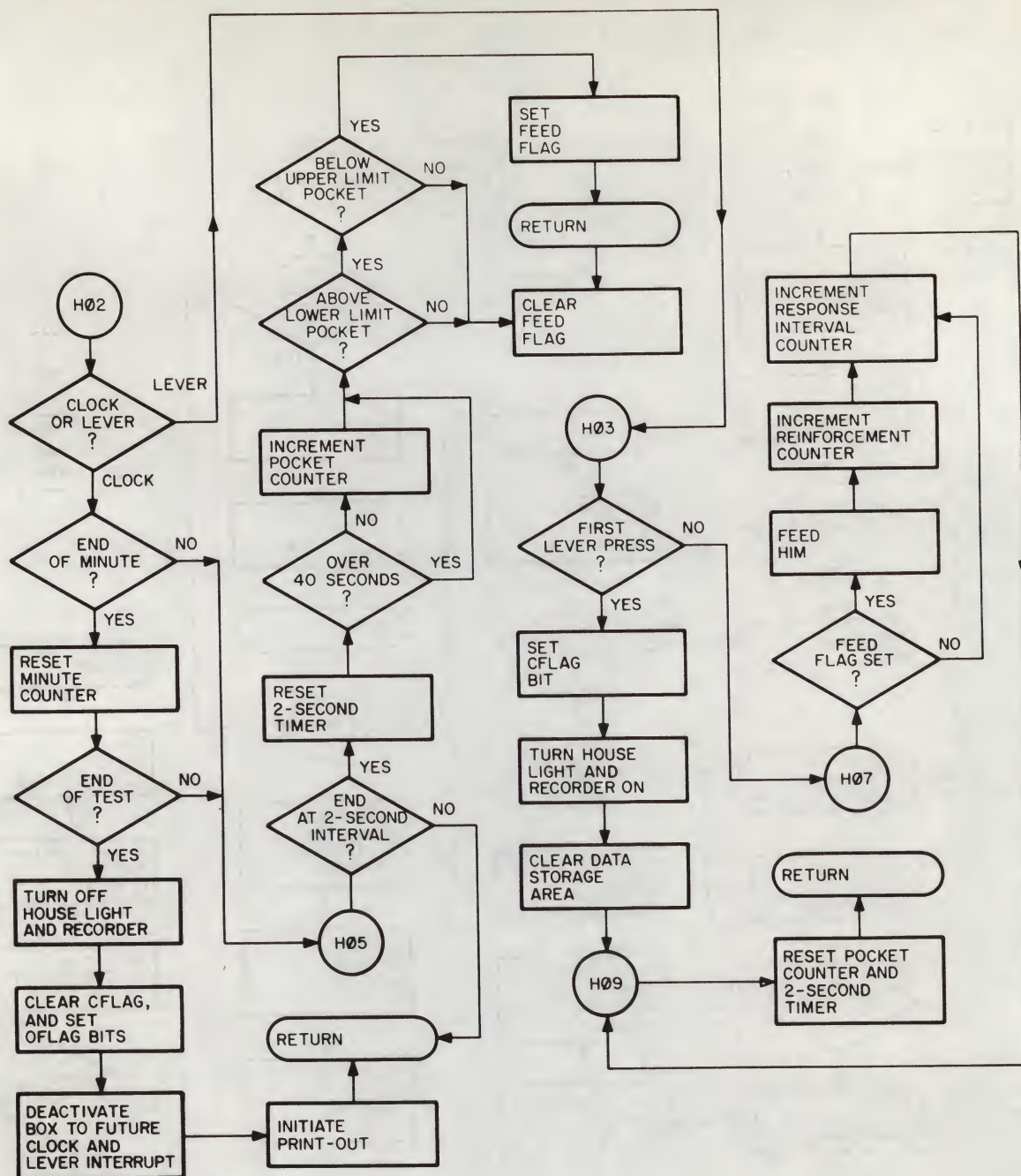
FR/FI System: FR/FI Clock



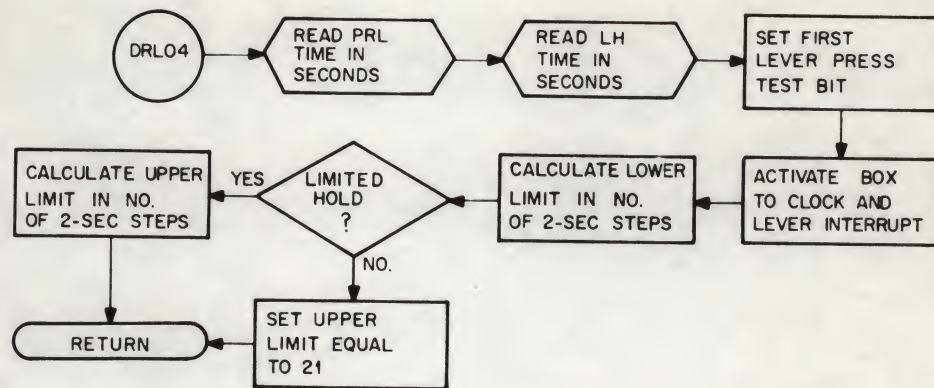
FR/FI System: FR/FI Lever



FR/FI System: FR Clock and Lever



DRL System: Clock and Lever (in each individual schedule page)



DRL System: Keyboard

